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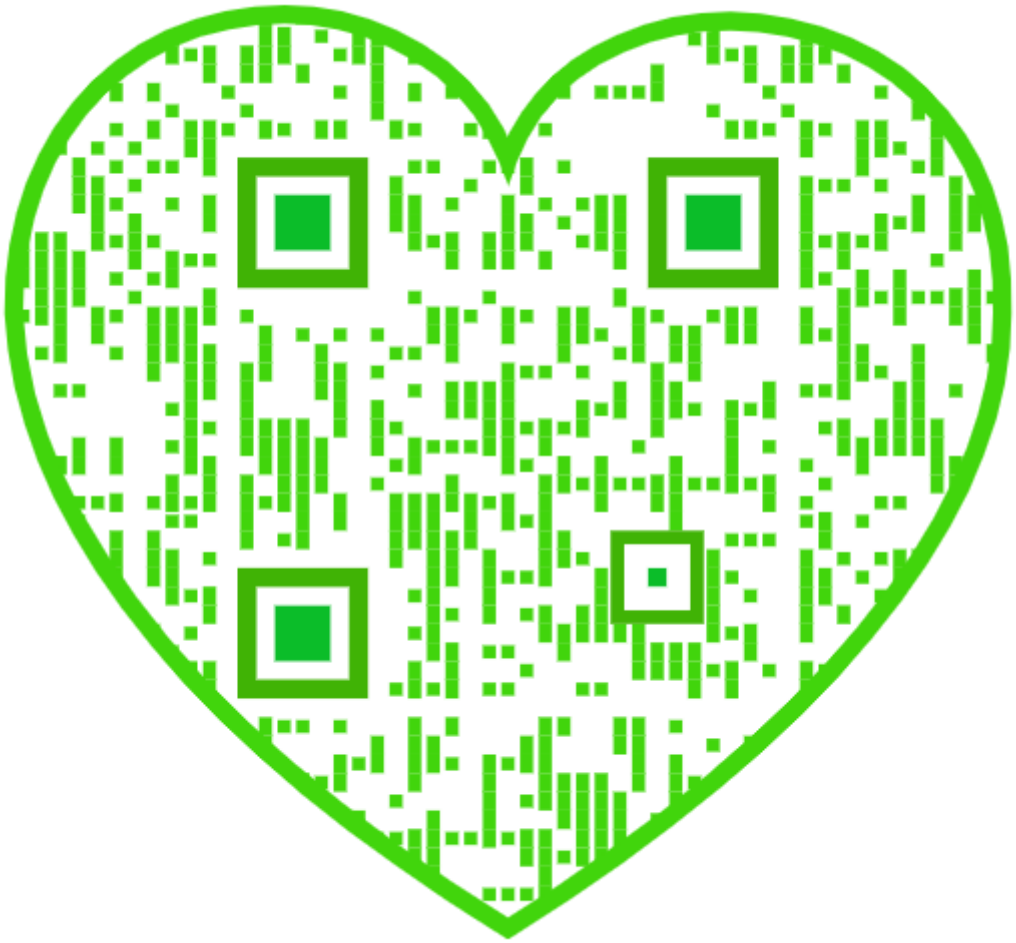

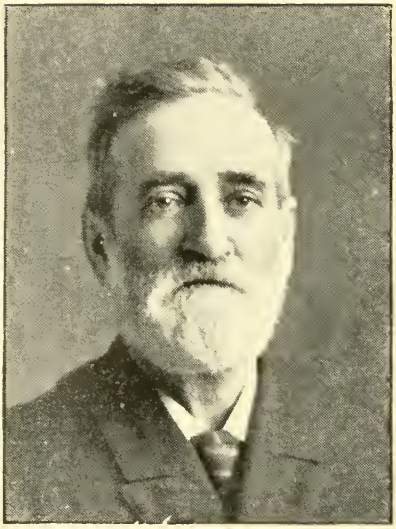

Yours truly
Henry Alley

IMPROVED QUEEN-REARING

OR

HOW TO REAR LARGE, PROLIFIC, LONG-LIVED QUEEN BEES

The Result of Nearly Half a Century's Experience in Rearing Queen Bees, Giving the Practical, Every-day Work of the Queen-Rearing Apiary

---

BY HENRY ALLEY

Apiarist

ILLUSTRATED

PRINTED FOR THE AUTHOR

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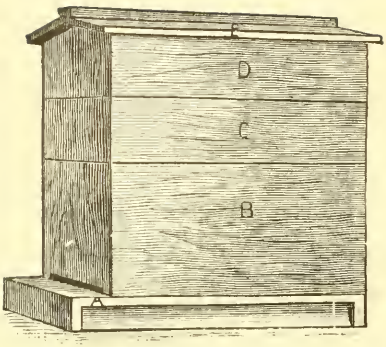
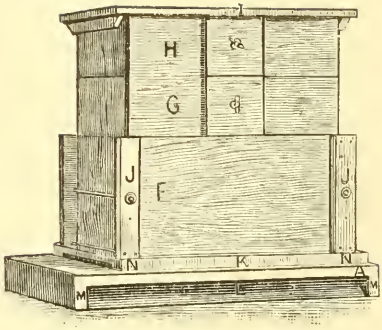
PREFACE

THIS little book is written and designed to instruct those engaged in bee-keeping in the art of rearing queen bees. The long experience of the author in this particular branch of apiculture, as herein detailed, may prove not only instructive but interesting. That the work may meet the approbation of its readers is the wish of

THE AUTHOR



Winter Case



Brood-chamber

Illustration of the original Bay State Bee-Hive. Invented and used by Henry Alley, more than twenty years ago. This hive was specially devised for wintering bees successfully on summer stands and for the production of the largest amount of honey

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IMPROVED QUEEN-REARING

OR

How to Rear Large, Prolific and Long-Lived Queen Bees

INTRODUCTION

IN the year 1857 I had very little knowledge of apiculture, yet I had seen bees in hives apparently working, "making honey" as it was called in those days by all who kept bees; had heard all the talk about the "king bee," and had seen hives draped in mourning when a member of the bee-keepers' family died. I had also seen the bee-keeper and his family out in the apiary pounding upon tin pans, ringing the dinner bell, and raising a hub-bub generally when a colony had cast a swarm. Then I had seen bees "carry wax" on their legs, etc., etc.

Well, I did not require very much experience with bees to find out that all the above performances were indulged in only by ignorant and superstitious bee-keepers. With all the literature we now have concerning apiculture, some bee-keepers may be found who know no more about bees than those who kept them 50 years ago.

In the month of July, 1857, I found a fine swarm of bees hanging upon a limb of a tree in my garden. The bees were hived in a small packing box, and at once commenced to build comb and store honey. When fall came the box was well filled with bees and stores, and the colony went into winter quarters in fine condition, and came out in the spring strong in numbers, proving to be a first-class colony in all respects.

In the spring of 1858, I purchased another colony which was in a box-hive that had a 7x9 glass in the back side through which I watched the bees many hours. Well do I remember the great interest I took in bees at that time. One day while watching the

bees through the glass, I saw the queen pass around one of the combs, and had really seen the great "king bee." Before winter set in, I had not only seen other queen bees but had actually reared a few. Then I got an idea that I had learned all there was to know about bees and queen rearing. But this little bit of egotism was dispelled by each year's experience, and I soon found that there was much to learn about bee-keeping. And now, after my long experience in queen rearing, I find that no one can live long enough to learn all there is to know about the subject of bees and apiculture generally. Surely no one can learn the art of bee keeping in one year as many bee-keepers of the present day claim.

Well, at the end of one year's experience, I was seized with a desire to go into queen rearing extensively. By this time I had learned that every colony of bees had a queen and that drones were male bees; and also found out hundreds of things about bees that I never before had known. I had discovered that when a colony of bees was deprived of its queen it would at once commence to construct queen cells, and rear several young queens.

Rearing queens was so fascinating that I soon began to rear them in great numbers, in fact I had them growing at all times during the warm months. Of course this was only for amusement as no bee-keepers were in want of queens, nor was there any demand for them. Well, I continued to advance in the art and enlarge my experience, not only in rearing queens, but in bee-keeping generally. About this time I found a man who had also been "stricken" with the bee fever and he had as much experience with bees as myself, and had reared queens merely to exhibit at a cattle fair held in his town and only three miles from my place. This man had made a frame about twelve inches square, to which glass was fastened on both sides, thus forming a one comb observation hive. A small piece of brood comb containing eggs and lavae was fastened at the top of the frame by strings, and the bees, of which there were about a pint, were actually building queen cells. Thousands of interested people were watching the bees while at work, and many of the people were asking all sorts of questions about queens, bees and honey. My first queens were reared in about the same way as above described.

In the year 1860 I practiced queen rearing on a larger scale, as we had then heard about Mr. Langstroth and his wonderful book and still more wonderful hive, which is today more marvelous than anything else connected with apiculture. From this time on rapid advancement was made not only in queen rearing but in

all branches of bee culture. We soon went from box-hives to movable-comb hives. About this time the famous Italian bees came in, and then queen-rearing was carried on in earnest; not for amusement but queens were reared by the thousand for sale. At first they were sent by express in small one-comb boxes, then by mail to all parts of the United States; later on queens went by mail to all parts of the world.

I have continued to rear queens for sale every year since 1860. At that time no one had much knowledge of queen-rearing, and Mr. Langstroth's book was the only guide for every queen-dealer, and without his hive and book but little could have been done in the way of rearing queens.

All who reared queens in those way-back days had good success in obtaining first-class queens. You see no one had got "on to" the idea that nature could be cheated and outdone in the production of queen bees. Within a few years queens have been reared by such methods that nearly all sold have proved to be worthless, so that dealers find they must go back and adopt some of the early methods in order to give satisfaction to their customers.

FIRST IMPROVEMENTS IN QUEEN-REARING

I shall not claim that any very great improvements have been made in the quality of queens reared by the methods given here.

Having told you how queens were reared in the early days of the queen-rearing business, I can now only give the process of doing the work in other ways by improved methods. It will be understood that after the advent of the movable-comb hive, bee-keeping took on a rapid move. The second advance of importance was made when Mr. J. B. Parsons of Flushing, N. Y., imported some Italian bees. It was soon noised all over the United States that the yellow-banded bees were better than the common black ones, or the German bee.

At this time many bee-keepers were in condition to rear queens and they did so, and thus the queen-rearing and supply business has been on the increase since the year 1862, or the advent of the Italian bee. We all had, or thought we had, a lot of "know how." Whether we had the know how or not, no one experienced any trouble in rearing good queens, all being satisfactory except in purity. Every one who purchased Italian queens expected them to throw *all* three-banded bees, and it was found almost impossible to get a breeding queen that could be

called strictly pure. There was no fixed purity to the Italians; they were and are to this day nothing but a hybrid strain of bees. With the exception of purity everything went on smoothly in queen rearing.

Although some improvement has been made in the purity of the Italians, there are very few pure queens reared; and bee-keepers continue to find fault with the queens they purchase if there happens to be even but a dozen "one-banded" bees in a large colony.

NOW LET US DISCUSS SOME OF THE IMPROVED METHODS OF REARING QUEENS

First the nucleus system. Any number of combs and bees taken from a full hive constitutes a nucleus colony. We will start on a three-frame nucleus with the L frame as a basis. Three such combs, say one of brood in all stages and two of honey and pollen, with all the adhering bees, are sufficient to form a good nucleus colony.

As there are but few bee-keepers who do not understand the above work, and as none are likely to begin queen-rearing unless they can handle bees to some extent, I need not go into the little details to describe how to form nucleus colonies. But we will suppose a three-frame nucleus has been formed, and the bees have been confined in the hive at least 24 hours with a supply of water, for bees that are deprived of their liberty, and are rearing brood or queens, must have plenty of water or the uncapped brood will perish. After 24 hours confinement the colony can be given its liberty and placed on a stand anywhere in the apiary somewhat remote, of course, from where they were first taken. After being queenless for this length of time, the bees will have started several queen-cells and have quieted down and only a few of the older bees will return to the parent hive.

Now, to increase the population of the nucleus and to make it thoroughly prosperous, other bees should be added each night, for three or four nights in succession, say at about sunset. This is easily and quickly done by taking a comb of bees from some strong colony and brushing or shaking them down on the ground in front of the nucleus. In doing this care must be used that the queen of the full colony is not taken.

The above was practiced by me in my early queen-rearing

experience when "vamping up" nucleus colonies. I was not long in discovering that there was great advantage in adding young bees as per above. By so doing I found that with each fresh lot of bees given the nucleus there would be a new lot of queen-cells started.

In a few days the colony will be well established, and queen-rearing by a most convenient process will be going on in a very successful manner.

Unless there is plenty of natural forage in the fields, the colony must be fed continually or inferior queens will be the result. In the course of about five days all the cells will be completed, that is, capped; and from eight to twelve good queen-cells, most likely, formed.

At about the time the first young queen should appear, (say the twelfth day from the day on which the eggs were given the bees), provision must be made for preserving the cells or the young queens. Other nucleus colonies must be made up for each cell or queen, as the case may be. The cells may be transferred at once without danger of destruction from the bees, provided the bees have been queenless for twelve hours. While bees might not destroy queen-cells if given them before they miss their queen, I find that they cannot be trusted in this respect, and that it is much safer to give queen-cells to bees that have been queenless at least 24 hours. It is not necessary to cut a hole in the comb to insert a queen cell, but push your finger down between the combs at the top and place the cell in the space thus made. If more convenient to use a queen nursery when the cells are ripe, full directions for so doing may be found on another page.

SOME OF THE DISADVANTAGES OF REARING QUEENS BY THE ABOVE PLAN

The above way of rearing queens has some advantages and some few disadvantages. The objections to such a method are not very serious, as they affect only those breeders who rear a large number of queens. When bees are left to rear queens and select locations for the cells, many of the cells will be built so near each other that they cannot be separated without destroying some of the young queens. I have found that if holes are cut in the combs to make convenient places for queens cells, the bees are

pretty sure to build them exactly opposite each other, that is, cells are built on opposite sides of the comb. Yet these cells can be removed; but in separating them the knife must pass through the base of one of the cells; damage that is easily repaired by a little warm bee's wax.

With the above minor exceptions, the nucleus system as above given is very good. For rearing queens on a small scale, I consider the above method as good and as practical as can be desired. Such queens will be found large, long-lived and in every way will equal those reared under the swarming impulse. If you desire to practice and experiment in queen-rearing, do not be afraid to try it. It is a good way for the novice to start in on rearing queens.

Removing the queen from a full colony of bees is practically the same method as above given; the difference is, however, that no more queen's cells are likely to be made than in a three-frame nucleus, and I hardly think one could get any better results by the full colony plan in the end. I very much prefer the nucleus system for rearing only a few queens, and it will be found much less trouble and much less expensive.

REARING QUEENS ON A LARGE SCALE

I think I have given as much advice as a novice will need on the subject of rearing a few queens, and will now describe how to rear queens by the thousands.

In this system a much smaller hive is used for nucleus colonies for keeping the queens until they have become fertile. The little hives, or boxes, used in my apiary have always worked as well with me as standard frames. The reader can do as he pleases about using them, but I advise testing the system and judging for ones self as to its merits.

Bear in mind that I am not laying down any stereotyped system of queen-rearing. I shall give only that part of my long experience that will prove of value to the inexperienced bee-keeper who desires to enter queen-rearing; and I hope it will result in the production of much better queen bees than many that are now being reared and sold. I advise the reader to carry out any experiments that this work may suggest to his mind. If any of my readers can improve upon the methods herein given, I advise them, by all means, to do so.

I shall hold back nothing, but give in this work a full

description and explanation of every valuable point I have found in my forty years' experience in rearing queen bees for the bee-keepers of the world. In connection with this business I have conducted hundreds of experiments that were found to be impractical and of no value.

I think many bee-keepers are in too much of a hurry to rush into print, when they are seized with an idea that they have made a valuable and important discovery in apiculture. When important discoveries are made it is time enough to make them public after a thorough test.

Well, I could go on and spread this story out over 200 pages of this size, but I think a more condensed form will be more comprehensive and better in every way, therefore I will get down to the point at once and drop the lecture part of the subject.

PROPER CONDITION OF THE APIARY WHEN QUEEN-REARING IS COMMENCED

All who undertake to rear queeens should understand that before such work should begin the whole apiary should be put in the highest state of prosperity ; and the colonies to be used in queen-rearing made very strong in numbers. The combs of all cell-building colonies should be well filled with honey and pollen. It would be the merest folly to attempt to rear queens when the whole or even a part of the apiary is in a state of semi-starvation. So you see queen-rearing should not be commenced in the spring until the weather is quite warm and the bees have had a chance to breed up, fill all combs with brood and gather nectar from the early bloom. Give the bees time enough on the early bloom to get the swarming fever on.

Here in New England, in Massachusetts particularly, the 8th of May is about as early as it is safe to commence to rear queens. However, if the weather is fairly warm in April and the first week of May, colonies can be so fed and stimulated that they may think it is about time to get ready to swarm. By the way, I have heard of swarms issuing as early as the 10th of May, and had one swarm on May 10, 1902.

Now here is a point at the start that should not be lost sight of. In breeding queen bees the same rules should be observed as in the breeding of animals. If desired to rear a colt, calf, chicken or any other animal, the parents selected are not taken from

scrubs or inferior stock. The very best are selected. The same principle applies to bees.

Now for a queen mother take the best queen in the apiary, also for a drone mother equal care should be taken to obtain the best. Of course in the selection of the mother queen color and beauty are important factors to be considered, and so is prolificness, longevity, and honey-gathering qualities. It takes pretty good stock to combine all the above named points. As for gentleness I find almost any strain of bees docile enough to be handled with the use of a good bellows smoker. However, bees that have vigorous dispositions are usually good honey-gatherers, and no queen need be rejected as a breeder on account of the vicious disposition of her worker progeny. Only an occasional queen breeds vicious bees, and this trait is but seldom transmitted to offspring.

TO PROCURE EGGS FOR CELL-BUILDING; WHERE TO KEEP THE BREEDING-QUEEN

If only a few queens are to be reared, the mother bee may be kept in a full colony; and if a few dozen queens only are required, I advise placing a comb that the queens have used once or twice for brood in the centre of a large colony. In about five days this comb should contain several thousand eggs. Now some good queens can be reared on this comb by the plan given as the nucleus system; but if you like to work with bees for amusement and experiment, try the plan I shall now give.

When a large number of queens are to be reared, it will be found a good plan to keep the breeding queen in a small hive having frames about five inches square, with five frames to a hive. I have used such an arrangement a great many years as above stated, and find it superior, in many ways to a full sized frame for getting eggs for cell-building. By this plan no combs are cut or mutilated when a few eggs are wanted, whereas if full frames are used many good combs will necessarily be destroyed during the season. Then again, it is very much more trouble and work to open a large hive than a small one when necessary to have some eggs to use. Any person rearing queens feels the need of time saving devices, as there is always something to do when queen-rearing is going on; I have found it so every day during the season.

One of the small combs will contain enough eggs for fifty

queen-cells, and a good prolific queen will fill such a comb and put an egg in every cell during each twenty-four hours. Does not the reader see that by this arrangement there are always fresh eggs at hand, and the exact age of the eggs can be known to within almost an hour?

This one thing alone is a great point with me in my system of queen-rearing, as I can know, and so can any one who practices this method, just when to prepare bees for cell-building.

If a comb containing eggs is removed every day and a clean comb inserted in its place, cell-building can go on every day in the week; and that is the right way to do if a supply of queens is to be kept up to meet the demands of customers whose orders come by every mail.

Now it may be that one queen will not supply all the eggs needed, or that it is desired to rear more than one strain of queens. When this is so, more breeding queens may be used, and they may be kept in small hives. I have found that one good queen will supply enough eggs for 1500 young queens in one season.

HOW TO START THE QUEEN-BREEDER COLONY

I will now describe the hive, fig. 1, for keeping the breeding queen in, and give the dimensions of all the parts so that any one

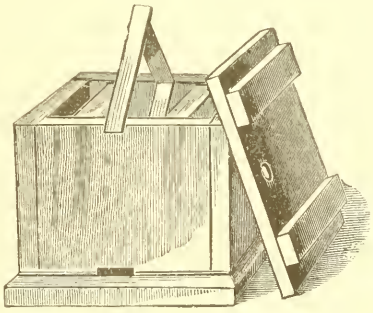


Figure 1

can make the entire thing. Sides of hive, 6 in. high x 7¾ in. long x½ in. thick; ends, 6x6 in., ⅞ in. thick. Make rabbit for frames to rest on ½x½ in. in the 6x6x⅞ in. thick pieces. As the top bar of frame is but ¼ in. thick, there will be a bee-space of ¼ in.

between the cover of the hive and the top of the frame, and plenty of room under the frames for the bees to cluster and be kept out of the way while the combs are being handled. The bottom of the hive is 9x8¾ in. x ⅞ in. thick and is nailed firmly to the bottom of the box. The top, or cover, is the same as the bottom only there are two 1x⅞ in. thick clamps nailed on to prevent the board from warping. Use 7-8 in. boards for the entire hive, excepting the sides, as these hives must necessarily be out in all sorts of weather, and rest upon the ground.

It will be found that the width of the hive allows for more room than a regular bee-space for four frames, but this is quite an advantage when handling the frames, as just a bee-space does not allow sufficient room for easy handling the combs; and if they go in closely the queen and many of the bees may be crushed when the frames are removed.

The dimensions of the frames are as follows: Top bar 6½x7-8 x¼ in.; bottom bar 5½x7-8x¼ in.; end pieces 5½x7-8x¼ in. The top and bottom bars are nailed to the end pieces. A block is used to form them on when nailed, so that when the frames are put up they are all alike.

To stock this hive with bees, brood, stores and queen, remove from a full colony one comb containing brood in all stages of maturity with the queen and adhering bees. Place the hive on the grass, or a cloth, and brush the bees from the comb directly in front of it. They will at once run in, or, at any rate, stay about the hive until the combs are transferred to the small frames. To cut the combs in the small frames, lay the full comb on a clean board, place one of the little frames over it, and with a sharp knife cut the brood into the frame. If nicely done no strings or sticks will be needed to keep the brood in the frame. One of the combs should contain honey, pollen, etc.

The bees will soon repair the damage done the combs and brood, and, in the course of 24 hours, this colony will be in condition for the business of producing eggs for queen-rearing.

If any clean and nearly new pieces of comb about the size of the nucleus frame are at hand use them for the breeding-queen to deposit eggs in. Never place the empty comb at the side of the hive. The queen will utilize it at once if placed near the centre of the brood-nest.

In four days after inserting the comb it will be filled with eggs and lavae in just the right condition for cell-building and queen-rearing. From this time on a new comb can be given the

nucleus each day. If desired to start cell-building every day in the week, eggs will always be found in the right condition for use if the above instructions are followed.

Now, I dislike the bother of starting queens every day. To avoid doing so and still have plenty of eggs, I use three breeding queens and start cell-building every fourth day. I like the idea of having hundreds of queen-cells growing at one time. Then when queens hatch they come in large numbers, and can be sent out by mail in the same proportion. A large queen-dealer cannot do a successful business on a small scale. He must branch out and have queens by the hundreds on hand at any time during the season from which he can draw a supply of fertile queens when orders are to be filled.

PREPARING A COLONY OF BEES FOR QUEEN-CELL BUILDING

I think I have made the matter of getting eggs for queen-cells so clear that all may understand how to proceed, and now will give several methods for preparing colonies of bees for queen-cell building.

I have always worked on the theory that bees should be put in proper condition for rearing queens several hours before any

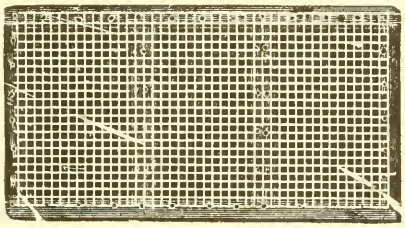


Figure 2

eggs are given them from which they may rear queens. The entire colony should be put in a "broody" state by dequeening and then given six hours at least to realize their queenless condition. There are three ways for doing this.

METHOD NUMBER ONE

Before giving any of the methods I will describe some of the necessary apparatus to use in this arrangement. One of the handiest things for use in the apiary is a wire screen shown in fig. 2. This screen is made in about the same style as a common

window screen and the size of the top of the brood-nest of the hive. I always have at hand some half dozen of these wire covers and they come into use many times when necessary to confine bees in the hive.

Now when ready to "seize" a colony of bees for the purpose of forcing them to rear queens against their natural will, proceed in this way: If a colony working in sections is selected, the super should be removed the previous day and all the bees allowed to return to the hive. When the sections are taken off place the screen on and just fasten it by one or two small nails. The next morning fasten the bees in by using a similar screen and suitable for confining the bees so that none can escape. Now the colony is ready to be taken to the bee-room and all the bees removed from the hive and combs. To the novice this may seem like a huge undertaking, yet it is not and does not require one half the time to perform as it does to describe it so that it can be understood.

I so arrange my workshop that all the above work is easily and quickly done. When the hive is taken to the bee-room it is placed on the cap of a hive and then I just sit down and at once commence operations. The first thing is to give the bees tobacco smoke at the entrance as well as some at the top through the screen, all the while drum on the hive, or excite the bees by striking the hands on the sides of the hive. This causes the bees to fill with honey and in the course of ten minutes they are ready and in condition to be brushed from the combs into a box where they will remain quiet until all are removed from the combs and hive. The screen is first removed from the top, the bees shaken from it, then the combs are taken out, one at a time, and all the bees brushed from them into a hive-cap. While doing this work some of the bees may attempt to fly, or crawl up the sides of the cap, if they do, more smoke is blown among them, when they soon quiet down and remain so for quite a while. When all the bees have been removed, the queen should be hunted up. If the work of finding the queen is rightly done, it will not require but a few minutes to find her. Of course the bees must be pushed over considerably in the operation. The best tool for such a purpose is the wide part of a 4x4 section. Never use feathers or a small broom for such work.

When the queen is found, the bees are forced into one end of the cap by a sudden strike of the box on the floor, and then they are quickly dumped into another box the exact size of the hive the bees were taken from. This latter box has a wire-cloth

bottom; the cover is a screen same as above described. This arrangement gives the bees all needed air while confined. It is necessary to nail three pieces of wood 7-8 inches square across the bottom of the box so that the air will not be shut out when the box is resting on anything. The bees are then put in a cool place until the time arrives for giving them eggs for cell-building.

The bees disposed of, we now have all the brood of a strong colony to take care of. Now for the first two or three colonies treated as above, I divide the brood among the weaker colonies in the apiary. By this operation, the light colonies soon become strong and in condition for the first flow of honey. At this stage of the work, we have a colony of queenless bees; the brood disposed of, and everything is in readiness for starting the bees to building cell-cups in a natural and practical way. We will now suppose the bees have been queenless six hours. The next move is to get the frame, or piece of comb containing the eggs, cut in strips and fasten in position so the bees will at once commence work on cell-cups.

This work cannot be done in a cold room. Have in the workshop a three-wick oil stove, not only for heating purposes but to use in other necessary work in queen-rearing operation. Another thing that must be at hand is a tin vessel in which there are equal

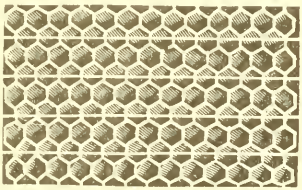


Figure 3

parts of rosin and bees-wax. Melt these on the oil stove, mix thoroughly and when quite hot it will be ready for use.

We will now suppose the comb containing eggs for queen-cells has been taken from the hive and is at hand ready to be prepared. This is cut in strips by using a thin, hot knife by the lines as shown in fig. 3. Now the egg in each alternate cell of the strips should be removed in order that sufficient room may be given for large queen-cells. I know of no better way of doing

this than by taking a common "scratch" match between the thumb and fore finger, inserting the "scratch" end in the cell and rapidly twirling it for a moment. This effectively destroys the egg as shown in fig. 4.

Now the next thing to do is to fasten the comb on strips of wood and in such a position that the bees will construct a large number of queen-cells. Fig. 5 illustrates three rows of completed queen-cells and the manner of fastening the strips of comb to the wood. This is done by lightly dipping the strips of comb

Figure 4

in the wax mixture. Just touch the edges of the cells of the opposite side of those in which the eggs were destroyed and quickly place the comb on the wood.

The strips of wood mentioned here, but more fully described on another page, are 1-4 inches thick, 1 inch wide and cut any length desired. The queen-cells shown are fastened to such strips of wood described. The cells illustrated are completed and nearly matured, or, in other words, are about ripe. The illustration shows but few cells; this was owing to the fact that they were built late in the season and from drawn foundation, in fact, they were the last batch of queen-cells of the season 1902. Earlier in the summer, the bees under the same conditions would have started many more queen-cells. However, the illustration is the best one I have been able to obtain of completed queen-cells.

To go back to fastening the strips of eggs to the pieces of wood, will say that when placing the strips in position if the comb is pressed down a little harder at both ends than it is in the middle, it will be made a little curving on the underside, thus giving more room for the queen-cells. But this curving business must not be carried too far, as too much curving will elongate the cells and the bees will remove the egg from all such and but few queens would be reared.

The reader will appreciate the fact that it is almost impossible to lay down any set rules, or to describe every little detail connected with the rearing of queen bees.

I can give all the main points in the business, but those who

rear queens by them must use good judgment and a fair amount of common sense. That is what is needed in the queen-rearing business. Experiment and practice are as much needed in queen-rearing as in any other occupation one is at work at.

A piece of nice worker comb 5x5 inches square will furnish all the eggs a large colony of bees should be allowed to work into queen-cells. Such a piece of comb if carefully cut will make about ten strips containing a dozen or more eggs. Always give eggs in proportion to the quantity of bees that are to do the work of cell-building.

When the strips of comb are fastened to the sticks and in the frame, they should be placed in a brood-box and the balance of the space of the hive filled by combs of honey and pollen. In no case use combs that have brood in them.

Now all being ready set the box of bees in a convenient place on the floor; put the box of combs between yourself and the bees.

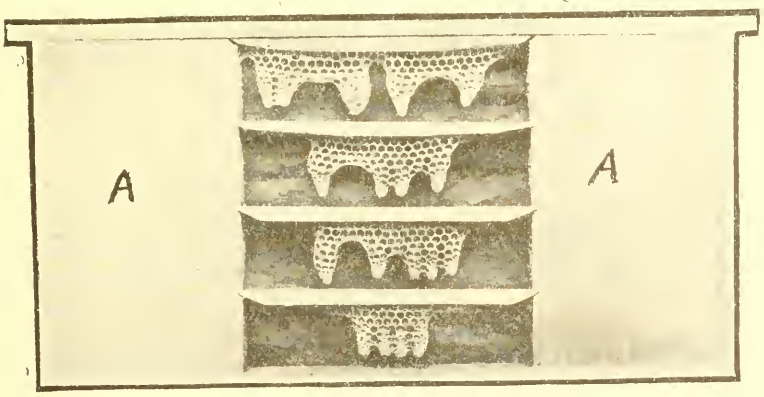


Figure 5

With a sudden drop of the box on the floor all the bees will go to the bottom and before they can recover from their surprise, remove the cover, place it on the box of combs and quickly place the combs over the box of bees. Now all the labor is done excepting giving the bees water until the next morning. All this work can be done without even one bee escaping in the entire operation.

The bees can be left in the bee-room over night, and placed

on the stand about 10 o'clock the following day. Water may be supplied them while confined by splashing a little over the frames and on the bees, through the wire cover at the top.

When the bees are released they may be somewhat excited, not being wholly reconciled to loss of their queen. To pacify them place a caged queen at the entrance for a few hours when, they will quickly quiet down and the queen can be taken away and all will go on as though nothing had happened to the colony.

The bees are left 24 hours to build cell-cups, and then another thing must be done if first-class queens are to be reared. Now the colony to which the eggs are given will commence to build from 40 to 60 cell-cups, or would rear from 40 to 60 queens if none of the cell-cups were removed. But such a thing should never be permitted, as not one queen out of all those reared would be of any good. Should the colony commence to build 60 cell-cups, the proper thing to do would be to divide that number of cells equally among three strong colonies of bees. Well, you say, how can this be done? If at this time bees are gathering honey from the fields and in a high state of success, the cell-cups can be placed above a colony of bees as has been and is now practiced by many breeders of queen-bees. I want it understood, however, that I do not so advise anyone, as by the method to follow this very much better queens are reared. Yet if bees are in a swarming mood, pretty good queens are reared over the brood-nest.

I shall advise all not to rear queens by above method excepting at swarming time, as under no other conditions can good queens be reared by such a system when any kind of a queen is in the hive the bees occupy. Of course, if a colony is about to supersede its queen, fairly good queens are reared while a queen is in the colony.

Only a few of the queens reared under the supersedence process are first-class. Bees do not seem to work with that interest when superseding an old queen as they do when absolutely queenless, or are about to cast a swarm.

THE THEORY OF USING YOUNG BEES IN QUEEN-REARING

I have given three methods of preparing bees for cell-building. The final result is the same in all cases. The only difference being in the manner of doing the work of preparing

the bees. Now, how many of my readers understand the correct theory of taking all the bees of a colony for such work rather than only a part of it? Let me describe. Old bees will not and cannot rear good queens; they will commence cell-cups and complete queen-cells, but no strong queens will come from them.

Why is this so? Simply because old bees have passed from the stage of nurses to the sphere of honey and pollen-gatherers, or out-door workers. Old bees cannot prepare the proper food for nursing either worker or queen-bee larvæ.

What are considered old bees in this connection are those that have been made queenless and kept so from three days to a week; such bees are of no value as cell-builders, as after being queenless thirty-six hours they seem to lose their enthusiasm and interest in the work.

Now as to the correct theory of taking *all* the bees of a colony for cell-building or for rearing queens. By such an operation every nurse bee in the hive is taken, and this includes thousands of just hatched bees that are maturing each day as nurse bees, thus keeping up a constant supply of nurses.

How many of the readers of this work ever watched bees building queen-cells in an observatory hive? Why, a queen-cell, until it is capped is never without a worker bee's head in it. The young bees keep a constant watch over the little worm within, and it is supposed that each bee that thrusts its head into the cell leaves a small amount of royal jelly. You all know that every cell from which a strong and healthy queen has emerged contains a lump of royal food as large as a pea. The amount is greatly in excess of the needs of the royal occupant.

It is the young bees that do all the labor in the hive and in rearing queens, and the more young bees there are engaged in the work the better will be the quality of the queens reared.

By this the reader will understand why all the bees of a colony should be used in building cell-cups and in completing queen-cells.

Has any one connected with the rearing of queen-bees ever before explained this point in any book or publication?

Notwithstanding the fact that young bees are constantly maturing as nurse bees, as above detailed, it is not good policy to compel any given lot of bees to commence cell-cup building a second time. After once starting one batch of cell-cups the interest and enthusiasm has vanished, and pretty poor work will be done.

Hens, ducks and birds of all kinds will sit on their eggs for a time, but there is a limit to the "broody" condition in all such cases. Hens have been known to sit six weeks, or rather have been compelled to sit long enough to "hatch out" a second brood of chickens. But in many such cases the nest is deserted before the second lot of eggs mature. It's but little use to overwork Nature. Natural laws must be observed in all such cases. This I have tried to apply to all my operations in queen-rearing.

PREPARING BEES FOR CELL-BUILDING

METHOD NUMBER TWO

My favorite way of preparing bees for cell-building is given in Method No. 1. No doubt many will say they cannot do any thing of the kind; 'tis too fussy and takes too much time, etc. It is not fussy nor in any way difficult to perform. However, I will give two other methods for preparing bees for cell-building, making a colony queenless, etc.

We must start in the same as in case No. 1, that is, the sections must be removed the day previous.

Now proceed in the usual way of "drumming out" a swarm. The proper way to do this, and the way I practiced artificial swarming, or dividing a colony of bees, is as follows: Blow rottenwood smoke among the bees through the entrance; this so alarms the colony that all the bees commence to fill their sacs with honey. By drumming on sides of the hive, while smoking is being done, greatly helps in the operation.

When the bees seem ready to go up into the cap, more smoke should be introduced and a vigorous drumming on the hive kept up. In this way about two-thirds of the colony will run up into the cap. Now give them a few minutes to sort of settle down and become quiet. Remove the cap, invert it and throw a cloth over the box. Give the bees a few puffs of tobacco smoke under the cloth. In a few minutes the cloth can be removed, the queen hunted out and the bees dumped into a box same as described in Method No. 1.

By this plan bees, in either box or frame hives, can be utilized for queen-rearing. The queen can be re-introduced at once.

In a few hours, bees thus prepared, will be ready to build queen-cells and all that is necessary to do is to proceed as in case of No. 1.

METHOD NUMBER THREE

Early in the morning remove the queen from a populous colony. At night they will be in a proper condition for cell-building. When ready, prepare the eggs and queen-rearing hive as given above. Remove the queenless colony to a new stand, twenty feet away, and put the queen-rearing hive in its place. Now after arranging to brush the bees down in front of the latter hive, take out the combs of the queenless colony and brush or shake, at least one-half of the bees in front of the queen-rearing hive. They will all run in and at once commence to construct queen-cells, and the next day will be seen working just the same as if nothing had happened to them. The queen removed in the morning may be given back to the old colony.

This operation so depopulates the colony that little will be done in the supers for a week or ten days. But as the combs are filled with brood in all stages, and as the queen is with them, the stock will soon recover and get back in fine condition.

I have tried to make the above very clear. Of course it is all plain and easy to me, but how other people can translate it so as to understand it is the question. In none of the works I have published were the methods made so clear, but nearly all who read these books have stated that they had no trouble in rearing queens by the methods given.

The "Beekeepers' Handy Book," a work of nearly 200 pages, and "Thirty Years Among the Bees" were treatises on queen-rearing published by me within the last fifteen years. Some 5000 copies were issued and both books are now out of print.

HOW TO REAR THE VERY BEST QUEENS

Of all the methods I have given or shall give for having cell-cups, or queen-cells completed, none of them will compare with the one given below. I believe this method is entirely new. Certain am I that it never has appeared in any publication, nor has it even been brought to my notice by anyone.

After reading what follows the reader will understand why I advised letting queenless bees work on cell-cups from twelve to twenty-four hours.

In the course of twelve hours after bees have worked on the queen cells, remove the queen from one of the strongest colonies in the yard. Twelve hours later remove one of the side combs from the hive and three or four other combs laterally so as to leave

space in the centre of the brood-nest for one of the frames on which the queen-cells are started. Now cover up with a super or in any way to suit the convenience of the apiarist. Not later than five days remove the frame of completed queen-cells to a queenless colony, replace the combs in the hive just as they were at the start and reintroduce the queen and never mind about looking the combs over for queen-cells, as the old queen will be well received and will soon destroy all queen-cells that may have been started.

Of course if there are cell-cups enough started by the queenless bees, say 40 or 60, not less than three strong colonies should be prepared as per above, as 20 queen-cells are as many as the largest stock of bees should complete.

The above operation does not so disturb the bees that they will desert the sections. In all this work it is better to be quiet and do the work as quickly as possible. Also do as much of it at about sunset as that late hour will permit.

NECESSITY OF QUEENLESS BEES

Right here will be found the necessity of queenless bees in the apiary. Such colonies must care for the completed queen-cells when removed from the colony that built them until such a time as the cells can be transfered to nuclei or the nursery.

One doing a large queen-rearing business will need several queenless colonies at all times. Not only must queenless bees be used in caring for queen-cells, but for queens confined in the queen nursery.

When the bees are removed from a hive for the purpose of starting more cell-cups, the bees that have just completed a batch of cells may be put on the combs and a queen given them at once, and in a short time, say two weeks, such a colony will be in as good condition as any in the yard.

This thing can go all through the queen-rearing season. Only a few colonies need be made queenless in the beginning, and then no colony will of necessity need be queenless.

I would not advise using one colony for cell-building but once in four weeks. It requires a lot of colonies to rear queens in the above way, but the results are so satisfactory it will be found much the cheapest in the end.

Good queens is the main point in queen-rearing. Never mind about the cost. If the right methods are used in rearing queens, good queens will cost no more than poor ones.

Bee-keepers the world over are interested in the subject of better queens. We all know that queens to supply the demand must be reared by what is called artificial methods. The best methods must be put in practice if the bee-keeping public is to be satisfied. Cheap and inferior queens have had their day, and those who rear the best will get the business and they should have it, too.

FEEDING WHILE QUEEN-REARING IS GOING ON

It should be understood that when queen-rearing is going on and no forage in the fields, feeding must be resorted to; a syrup composed of honey and granulated sugar will answer all right for food. Feeding not only keeps up the excitement, but the interest in the work the bees are doing. Keep up a liberal supply until the cells are capped.

During the past season I conducted some experiments in feeding clear honey and clear sugar syrup while cell-building was going on. The results of my experiments clearly show that sugar syrup with some honey is just as good to feed bees in queen-rearing as the best honey. This fact I could not believe until I had made the above experiment; therefore it will be seen that food has no influence whatever on the quality of the queens reared. Other conditions and circumstances do have a positive influence on the embryo queens; large colonies, thousands of young bees, plenty of stores of both honey and pollen, and then when the colony is put in fine condition for queen-rearing, the result is fine queens. Observe all these conditions if success is desired.

THE QUEEN NURSERY AND HOW TO USE IT

One would naturally think that when a lot of ripe queen-cells are at hand the thing to do would be to form nuclei for the reception of the cells or young queens. It is not so in my case. I never allow queens to hatch in nuclei. My reasons for this are many. I like to secure a large number of queens, say 50 or 100, and critically examine each one to see that they are all right before making up nucleus colonies.

All of my queens are hatched in nurseries and in such cages as illustrated in fig. 6. The size of these cages is such that 35 of them just fill one standard Langstroth frame having a thin

top bar. These cages are sawed and fitted so nicely that they will stay in the frame without fastenings of any kind.

It will be seen that there are two holes in the edge of the cage. One is for a queen-cell, the other for a small piece of sponge which is filled with honey slightly diluted with water. The water prevents the sponge drying too quickly and the honey furnishes food for the young queens some two weeks. When the cages are ready, and the cells in them, a frame is filled and then is placed in the center of a large colony of bees, and between two full combs of brood. This sort of hive-incubator works splendidly and in the course of 48 hours all the young queens will be hatched out, when the nursery should be removed and placed in a queenless colony or in a colony nursing unhatched queens.

Before any young queens are introduced they should be closely examined, and if any are found not up to the standard, or in any way inferior, they should be destroyed. If any cells containing inferior queens are given nucleus, or inferior queens introduced, and not looked after until they have been in the hive long enough to become fertile, it will be found that much valuable time

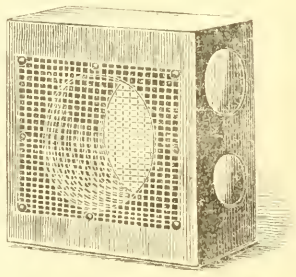


Figure 6

has been lost. I cannot afford to take such chances, therefore I want to see and examine all queens before giving them to colonies.

The above is one of the reasons why I use a queen nursery; another reason is that each nursery cage is equal to a nucleus colony.

My plan has always been to have queens ready to give nuclei in three days after removing a laying queen. That is as soon as a virgin queen can safely be introduced in such cases.

The queen nursery is one of the most valuable implements

any queen breeder can have in his apiary. Nothing has ever been devised that equals its usefulness. I surely could not rear and ship the large number of queens I do every year without using a nursery, or going to the expense of running double the number of nucleus colonies to take the places of the nursery cages. The nursery saves about one half the expense in money and bees, as well as much labor. I not only use the nursery for virgin queens and cell-hatching, but for keeping a supply of fertile queens all through the season.

The nursery illustrated in fig. 7 is of an old pattern, takes but 18 cages and accommodates only as many queens.

FORMING NUCLEI

This part of queen-rearing reminds me of the remark made by Mr. S. M. Locke when he returned to Wenham after spending two or three seasons with D. A. Jones and J. H. Nellis, both of whom were engaged largely in the queen-rearing business.

I made up a lot of nuclei while Mr. L. looked on and saw my way of doing such things. "Well," says Mr. L., "I never saw

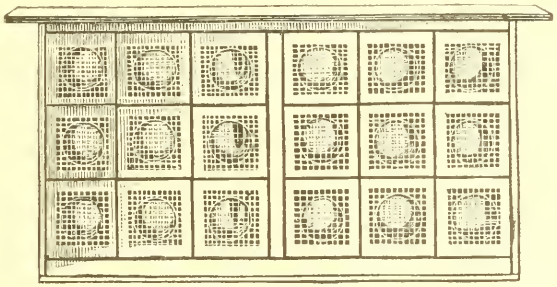


Figure 7

nuclei made up in such a quick and easy way!" My way may be better than some others do it. I plan to do all my work in the easiest and quickest way. I find no time to waste in the queen-rearing business.

In forming nucleus colonies I will first give a way that all must practice when starting in on queen-rearing. All my nucleus hives, or boxes, are the same as is illustrated in fig. 1. I

like this style far better than any I have ever tried. Always have had the best of success in getting queens fertilized in them, and, in fact, never have had any trouble with these hives in any way. Some people suppose, and naturally enough too, that where these little colonies are kept in the same yard with strong colonies, that much robbing would be going on. It is not so, and I never have had any robbing in my apiary. No good bee-keeper, it seems to me, so does his work in the apiary that robbing is induced. Of course when putting up queens the nuclei must be opened in the middle of the day. Sometimes robbers come around to see what is going on. The work of removing a queen is quickly performed and if strange bees appear the hive is closed; that is, combs replaced, cover put on and a handful of grass is thrown against the entrance. While the bees of the colony can find their way out of and into the hive, no strange bee dares to try to enter.

If I were about to start in queen-rearing I would form nuclei in about this way: Rather than destroy the nice straight combs of a standard hive I would just look around the country for some box-hives. I really love to go through those back-number things; they are an eye-sore to me.

Take the hive into the bee-room and treat the bees same as in case of getting "bees for cell-building."

Take off side of hive, cut out the combs and brush all the bees from them into a hive-cap. When all are out dump the bees into the box used for confining bees for queen-rearing. Next move is to cut the combs into the little frames. After first nailing screens to cover entrance to the hives in such a way that the bees will have plenty of fresh air, the boxes should each have three combs put in them. One of the combs should be brood, the others may be brood, honey, etc. One comb of honey may be put in after the bees are in.

Have at hand all the covers so they can be put on quickly after the bees are put in.

We return now to the bees in the confining box, and all is in readiness for dividing them up in pint lots among the hives.

Next step is to get the bees in condition to be handled without flying while they are being doled out to the several hives. Blow tobacco smoke among them until they seem quiet. Now this does not mean to keep up a flow of smoke until the bees drop to the bottom of the box. Use but little smoke at any time, or until the bees stop running about the box. In the course of 5 or 10 minutes they will be ready to handle. Strike the bees down

into the bottom of the box by dropping it on the floor. With a light measure (tin one is best) holding about a pint and having a handle several inches long, divide the bees among the nucleus hives in nearly equal parts as possible. If the bees have been put in the right condition by the tobacco, they can be handled just about the same as so many beans.

Of course there will be a queen to look up. However, this is an easy matter. Rather than spend the time to look her up she is

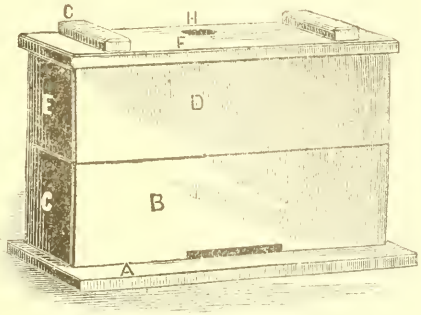


Figure 8

allowed to go in with the bees. When the nuclei are formed, the bees in the hive in which the queen happens to be will be found more quiet than those that have no queens. Unless I have some use for such a queen she is allowed to remain with the bees and build up a prosperous colony; that is, prosperous for such a small hive.

Sometimes I have as many as half a dozen queens caged in my bee-room. They are placed on the bottom sash of the window and all the bees in the room collect and cluster on the cages, attracted and held there a long time by the queens. The bees feed and otherwise take good care of them.

Another way to do, and a thing I often do is this: I sometimes purchase bees in box-hives, transfer the combs and then put bees and combs in a hive that takes 13 of the frames, using two sections for a large colony. The 26 combs give a large amount of breeding room and such a colony very quickly builds up to a large and prosperous one. Such a hive is illustrated in fig. 8.

The bees thus treated soon repair the combs and get into fine condition to be transferred to the small hives. When nuclei are

formed as above, they should be kept confined in the hives from 24 to 48 hours before being released, then remove the screens at night when too late for bees to fly. The next morning the colony will be found ready for business.

By this time the bees will have more or less queen-cells, or cell-cups started, and fully reconciled to the new state of things, and only a few of the older bees will return to the stand they had previously occupied.

The only thing that can be done with these hives is to set them on the ground in any place in the apiary. Still, it is a good idea to take them away from home for several weeks when they may be returned to the home yard and no bees would return to the old location.

I sometimes have several queen-rearing yards two miles apart where my nuclei are kept during the entire season—several hundred nucleus colonies are made up and at once taken away and in this way out apiaries are established, but for nuclei only.

If more convenient to do so bees may be brought from a distance for forming nucleus colonies, and when this method is practiced the bees can be placed in the home yard. This plan works nicely as I have found when forming nuclei.

INTRODUCING QUEENS

We have now come to one of the most interesting parts of apiculture, and that part of queen-rearing that has been the cause of much trouble and a great deal of discussion for many years. When it comes to the introduction of queens, either fertile or unfertile, nearly all bee-keepers, whether experts or novices, are all at sea.

In the case of introducing unfertile queens, one thing should be kept in mind, namely, the older the virgin queen the more difficult and dangerous it is to safely introduce them. Virgin queens, so far as bees are concerned, cease to be "baby" queens when they are three days old; after that it is very difficult to introduce them, though I have no trouble in introducing them successfully by using tobacco smoke.

I cannot say which is the most difficult to introduce, virgin or fertile queens. It requires in either case some little experience in order to be successful. Some times bees will destroy a strange queen even when she is introduced under the most favorable con-

ditions. No one can introduce a virgin queen successfully unless the bees to receive her have been queenless at least three days.

In all my experience I have practiced but one method of introducing queens. It is what I term the three-day plan. I seldom lose a queen by it. No doubt other bee-keepers have as good methods of introducing queens as I have. But the first and last queens I have introduced were by the system given below. I cannot think of giving up a sure thing for something I know nothing about.

HOW TO INTRODUCE VIRGIN QUEENS

My plan is to let colonies, whether full stocks or nucleus, remain queenless three days, or not far from 72 hours. Then just before dark the queens are given the bees by this process: I generally have from 25 to 50 virgin queens to introduce at one time. The cages are placed in a convenient box having a handle. Then as many plantain leaves as there are queens to introduce are pulled and put in the box ready for use. These leaves are for closing the entrance to each hive in which queens are to be placed. Armed with the pipe before mentioned, all is in readiness for introducing the queens. The feeder used at the top of the hive is removed, a good dose of smoke is blown in among the bees and combs. The feeder replaced until the stopper in the cage is removed, and then the queen by a quick motion is thrown out and into the feeder hole. Then the feeder is again quickly put in position, and no further attention is given the bees.

I have introduced successfully as many as fifty virgin queens in thirty minutes.

The art of introducing unfertile queens requires more experience to be successful than it does to introduce fertile queens. In fact, one must be very apt, possess a good deal of tact, and I can almost say, must be very scientific. However, most any bee-keeper can learn how to perform such work successfully. One may read how others do these things, but practical knowledge, in order to know all the little details of such intricate and delicate work as introducing queens can only be had by long practice and experience. Just how much tobacco smoke to give the bees when introducing a queen is a point that requires more or less practice and good judgment.

I never have been so unfortunate as to give bees too much smoke at such times. Am not certain that bees can be killed by

tobacco smoke if they can get fresh air soon after smoking them. The effect of the smoke soon passes off and the bees resume a normal condition.

Bear in mind that unless the work of introducing queens by using tobacco is done very late in the day, or on some cool day when bees cannot fly very much, your apiary will be ruined, as robbing may be induced. Tobacco smoke puts the bees in such a condition they cannot defend their stores from robber bees, and once robbing is commenced among the small nuclei it is almost impossible to stop it. Should such a thing happen it would be necessary to remove the entire nuclei to a distant location.

INTRODUCING FERTILE QUEENS

It requires some experience and practice to introduce fertile queens. Allow all full colonies to be queenless three days before giving them a strange queen. Even a queen removed from a colony but twenty-fours, if returned would be received as a strange queen. Now when the colony has been queenless seventy-two hours, give the bees tobacco smoke and let the queen in; or allow the bees to eat the candy-food out and liberate her. The smoke from a cigar or pipe will do to introduce fertile queens, but not virgin queens.

Never put a queen near the bees of a colony she is to be given to until ready to introduce her. Many make this mistake. Toward dark is the time to introduce queens whether or not tobacco is used. Certainly this has been my experience.

In introducing queens by using tobacco it is not necessary to give the bees a powerful dose of smoke. Give enough smoke so that the bees will feel the effects of it pretty well. The tobacco sort of odorizes the combs, bees and queen, so that all are scented alike. When the bees recover from the effects of the smoke they really don't remember whether they were ever without a queen, so they take kindly to the new queen and no trouble ensues.

I once tried a "chew" of tobacco. Was on my way to school. In a short time I didn't care whether school kept or not, in fact, I hardly knew anything about it I was so sick. That was my first and last "chew" of tobacco. Now I imagine the bees feel somewhat in that way when they are made sick by tobacco.

Bees cannot be killed by tobacco if they are given the air. The plantain leaves by which the entrance hole is stopped is thrown out, or so loosened before the next morning that the bees

get all the air they need. One passing by the hives in which queens were introduced the previous evening cannot discover that such work was done by any indications about the hive or bees.

OBJECTIONAL DRONES; HOW TO CATCH AND DESTROY

If black bees, hybrid bees, or, in fact any bees that are to be used in queen-rearing have undesirable drones among them they can be easily caught and destroyed. The most effective way of doing this is when the bees are put to work building queen-cells. My way of doing it is as follows: At the time the hive for cell-building is prepared and is ready to place over the bees as given on page 23, a metal division-board is put on the box and then the hive containing the prepared strips, combs, etc., is quickly placed on the metal. Nearly all the worker bees at once go up into the box above, leaving the drones below.

In placing the bees on the stand it is not necessary to use smoke of any kind. First, place a bottom-board in position and

Fig. 9

Fig. 10

quietly raise the box containing the bees, letting the rear end strike the bottom-board in such a way that the combs will not be disturbed and gradually lowering the hive so as not to crush any bees.

The box of drones may be so placed against the front end of the bottom-board that all the young bees, if any are left in the box, may run out, leaving the drones below the metal to perish.

Just such a frame as is used for the wire screen cover may be

used to nail the metal to, as the entire top of the box should be covered in order to catch all the drones.

How to catch and destroy drones in full colonies will be explained under the head of "Drone and Queen-traps."

DESCRIPTION OF QUEEN-CELL FRAME

In my early experience in rearing queens I used combs in standard L frames to attach the strips of comb containing the eggs

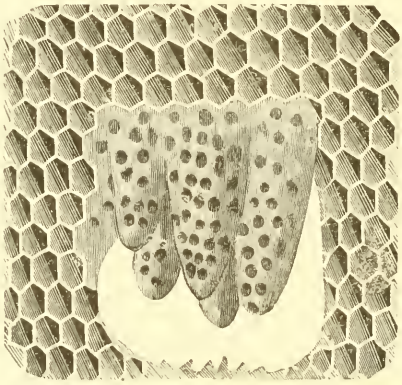


Figure 11

for queen-cells. While such an arrangement worked well in 3-frame nucleus colonies, there are disadvantages in so doing when used in full colonies and by my present system of queen-rearing; therefore I adopted the all-wood frame and in combination with the wood-strips as shown in fig. 5 and it works nicely.

The frame is a standard L style into which are nailed two pieces of wood A A. There are four notches cut in on the inner edges two inches a part, into which the four pieces of wood are placed and are thus held firmly in position.

By examining the queen-cells illustrated in fig. 5, it will be seen that they are long and pointed, also very heavily waxed and corrugated. They do not much resemble the row of queen-cells lately illustrated in one of the bee-papers.

The heavy waxing and large, long cells are the strongest indications that such cells contain very hardy and perfect

queens. Fig. 9 illustrates a perfect queen-cell, while fig. 10 shows a queen-cell that always contains inferior queens.

Queen-cells that are short, blunt-end, thin-walled and thinly waxed, as shown in fig. 10, contain very inferior queens, and all such cells should be destroyed. They are just such queen-cells as bees make when they have a queen of any kind in the hive.

The cells shown in fig. 5 were built in a powerful queenless colony late in September, 1902, and were the last lot of cells built in my apiary that season, consequently not as many cells were built as would have been the case had the season not been quite

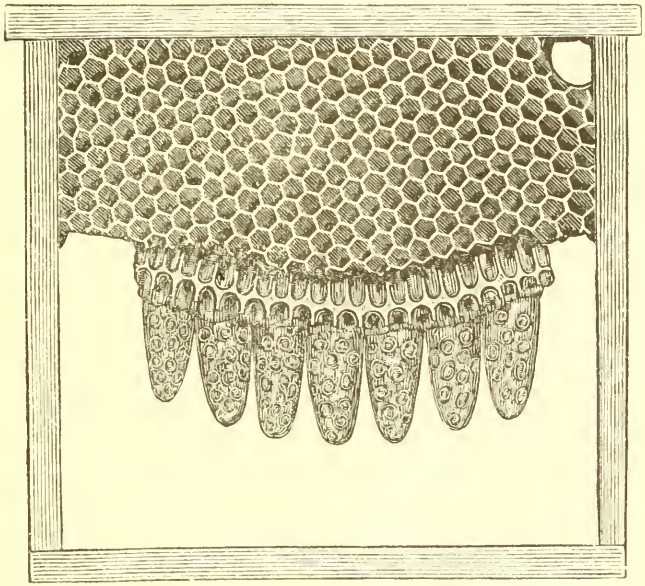


Figure 12

so far advanced, yet the number of cells are as many as the strongest colony of bees should be allowed to build or finish up from the 24-hour cell-cups. The mistake many queen-breeders make is in permitting one colony of bees to build so many cells in one batch.

A colony that has cast a swarm seldom leaves over eight or

ten queen-cells. In rearing queens it seems to me the breeder might be governed somewhat as to the number of cells a colony should build by the judgment of the bees when working as Nature designed them to work. However, bees do not do things as we think they should, therefore many try to improve matters, and I freely admit that I think in some cases man has made the bees do many good things they would not have done had they not been compelled to, or been assisted to do in their work.

For instance, let us take up the way bees construct queen-cells when left to do it in their way, or, in the natural way. Fig. 11 illustrates how bees build queen-cells when they have their way in the matter. Now how can cells built in that manner be cut out without destroying many of them? It cannot be done. The cells are built in a cluster and all fastened to each other. Some of them could be patched up as described on another page, and many good queens would be reared. The very best queens are produced by the cells built as shown in the cluster, nevertheless. Fig. 12 illustrates the improved way of compelling bees to construct queen-cells. It will be seen that all the seven cells can be separated without destroying any of them when necessary to cut them out to place in the nursery or in nuclei.

TRANSFERRING CELLS TO NUCLEI OR TO THE QUEEN-NURSERY

As queen-cells are now built so that they are easily cut out and separated without destroying any of them, the work of transferring them to nuclei or to the queen-nursery is not difficult, nor does it require much time or labor to complete the work. Put all the cells in the nursery and allow them to hatch and then after selecting the best queens introduce them to nucleus colonies prepared as given on another page. Sometimes there is difficulty in separating all the cells without cutting into the side of a few of them. Excepting the time required to patch them up, no great harm is done.

When the cells are ripe, and that is on the twelfth day from the day the cells were started, remove from the hive, brush the bees from them and at once take them into a warm room, providing the weather is cool, and 'tis most always cool in the months of May and June.

The knife used to separate the cells should be very thin, sharp and warm. If a cell is cut into, just take a piece of thin

foundation, slightly warm it, place it over the aperture and at once smooth it down with a warm knife so that it will be perfectly air-tight, if not so done, the queen might not hatch out, and she certainly would not if she is not within six hours of being ready to. If a patched cell is given to a nucleus colony, and not made perfectly air-tight, the bees would quickly destroy it. Bees will not accept any inferior work about queen-cells. Perfection is their motto. Nevertheless, I sometimes think bees lack in judgment in many things; such for instance as in destroying a fine young queen when they seem badly in need of one. But they lack in judgment very much when they use their stings to their own destruction.

DESCRIPTION OF PIPE FOR BURNING TOBACCO

I have always used tobacco smoke for light handling of bees, but more particularly for introducing queens.

I shall state here that for general use in the apiary tobacco is not the thing to burn. Doing light work and temporary use the tin pipe can be made to work all right. As I am constantly working in my queen-rearing apiary, I find tobacco smoke much the handiest, as well as the most convenient.

I do not wish any reader to think I recommend the filthy weed because I am a tobacco fiend. Although I have used the vile stuff in my apiary more than forty years, I have not been able to acquire the tobacco habit. So it will be seen that in order for me to use tobacco about my bees, I must have some special device to burn the stuff in.

I devised the pipe illustrated in fig. 13 many years ago. Body of pipe is about 6 inches long x ⅞ in. in diameter and made of tin. At each end is a wooden stopper, one a mouth piece, the

Figure 13

other has a ¼ in. tin tube running through it and projecting about an inch beyond the wood through which the smoke is directed among the bees.

The pipe is filled with fine, dry tobacco, and is lighted by placing the small tube in the mouth and puffing away the same as any old smoker does when he puts fire to his old T. D. When the pipe is well fired up, the mouth piece is put in and all that is

needed to break up a town meeting is to blow the breath through the pipe.

Full colonies of bees can be handled by using tobacco smoke, but they do not take kindly to it, and sometimes resent the insult with a vengeance.

A good bellows smoker filled with dry, rotten wood is much the best thing to use when opening a hive of bees. But in introducing queens and light work, in the apiary, the tin pipe will be found very valuable. Of course no one would think of using tobacco when extracting. In putting up queens I find the pipe very handy. It is held between the teeth, the cage in the left hand and the queen and bees handled with the right hand, as both hands are at liberty. Well, how handy!

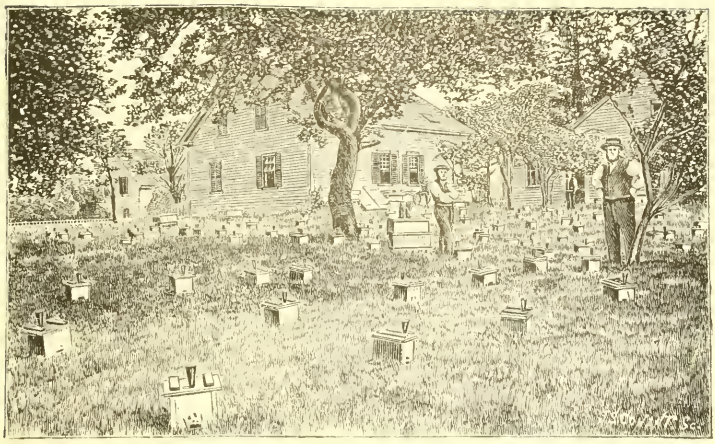
WHAT TO DO WITH SMALL NUCLEI IN THE FALL

If the queens are allowed to stay in the little hives late in the season and long enough to fill the combs with brood, and the colonies are well fed, there will be a fine lot of bees in the fall when all the queens have been taken away, and they may be united and wintered in good condition.

Make hives in two sections same as illustrated in fig. 8. These hives are the same in every way as the little boxes excepting they are made to take 13 combs instead of four combs. Use two sections in winter as this gives sufficient capacity for wintering a large numbers of bees. In three days after the queens are removed from the nuclei, they are in condition to be safely united with little or no trouble. Get the winter hive ready, give it a stand near the nucleus the queen is in that is to be given the united colonies, and then take the queenless nuclei to that stand and at once place bees, combs and all in the large hive. Put in as much brood as possible, placing it in the center of the hive.

Now the tobacco pipe described above comes in here pretty handily. Just give each small colony a puff of smoke before starting them, and all the bees and queen will at once adapt themselves to their new home. Few if any bees will return to the old stand. Feed the newly formed colonies about 20 lbs. syrup to which several pounds of good honey has been added to prevent granulation.

When cold weather sets in, put the colonies in the cellar. In the spring when placed on the stand, put on outside cases, fix



Above illustration gives a partial view of the author's queen-rearing apiary. The person on the left is S. M. Locke, former editor of the American Apiculturist; on the right is the author. This photo was taken in the summer of 1882. There has been but little change in my apiary since the picture was made.

them up warm and if need be feed more syrup, and my word for it, you will have some fine colonies with which to form early nuclei when needed.

I had nuclei enough in the fall of 1892 to form 21 strong colonies of the kind above mentioned.

TO GET DRONES AND PRESERVE THEM THE ENTIRE SEASON

Much has been said in the various bee-papers as to how drones can best be obtained and preserved the entire queen-rearing season. Here is how it is done in the Bay State Apiary. When I have settled upon the colony that it is most desirable to rear drones from, a full sheet of drone comb is placed in the centre of the brood-nest. There being no drone comb of any amount in the hive, the queen at once puts an egg in each cell. This comb is allowed to remain in the colony till most of the drone brood is capped, then it is removed and placed in a queenless colony, or one that is caring for queen-cells, or has a lot of virgin queens in the nursery. Another frame of drone comb is at once placed in the same hive. The bees, finding they have no drones or drone-brood, at once commence to rear another lot. This goes on all through the season. I have found that one colony of bees will supply all the drones needed for the entire queen-rearing season, or for many thousands of queens.

Please understand that when forage is cut off, the colony must be fed in order to stimulate drone brood-rearing.

If the reader knows of any better way to get drones for queen-rearing or for doing any of the things on the foregoing pages, by all means adopt and practice them. I have given you methods that have been successful many years.

WHEN, WHAT AND HOW TO FEED NUCLEI

I think I can save all who use my system of nuclei very much trouble by giving instructions how to care for such colonies, and to make the method a success, and prevent robbing in the apiary. Under no circumstances ever feed anything but plain sugar syrup to the small colonies. If you use honey your entire nucleus apiary will be ruined within a few hours, providing there are any full colonies of bees near them. Sugar syrup is all that is needed to keep the nuclei up to the highest standard of prosperity.

There are three reasons why such small colonies should be fed as above stated. 1. To keep them in food. 2. To prevent the bees from deserting the hives and 3, to stimulate the bees and cause the queens to fly and mate promptly. Now the last reason is very important. Unless these little families of bees are fed as often as each five days, the bees will desert the hive (swarm out), even though they have plenty of stores and brood. Of course they will not "swarm out" unless there is a queen to go with them.

Make the syrup as follows: Put 13 lbs. of granulated sugar in a 10 quart bucket and add enough water to fill the receptacle. This is about right—not too thin nor too heavy. See that all the sugar is dissolved before using.

The feeder illustrated in fig. 15 is cone-shaped, made of tin and is atmospheric in principle. When filled it is inverted; the opening covered by a piece of thin cloth, the collar (a) put on to keep the cloth in place, and when thus prepared the food will not leak out. An aperture, an inch in diameter, is made in the cover of

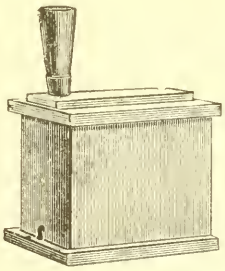


Figure 14

Figure 15

the hive about an inch from the front edge; and as the apex of the feeder is but seven-eighths of an inch in diameter, is held firmly in place, and no amount of heavy wind will dislodge it.

The small quantity of syrup placed in the feeder is sufficient to encourage the bees for about five days, when more food should be supplied. It is understood, of course, that no feeding is necessary when there is plenty of natural forage for the bees to gather. I know of no other feeder, or system of feeding that can be applied to work so well as the one above described.

Figure 14 represents one of the small nucleus hives with

the cone-feeder in position. As water during a rain may leak into the hive around the feeder, it is always placed in the front part of the cover. Always place the hive in such a position that the rear end is slightly elevated. This keeps the water from running in at the entrance, and if any water gets in at the top it quickly runs out.

The success of my nucleus system depends largely upon the manner of feeding. These little miniature colonies are unlike large colonies. They can only care for themselves when forage is abundant. Feed them liberally and success will follow.

THE DRONE-TRAP IN CONNECTION WITH QUEEN-REARING

The reader's attention is called to the utility of the drone-trap in queen-rearing. It's a wonder to me how it is that any queen breeder can produce queens that can be called *pure* in the same

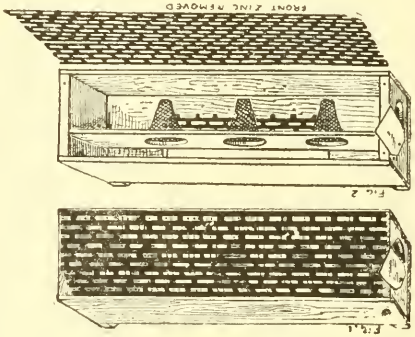


Figure 16

apiary where there are anywhere from ten to forty full colonies of bees sending out their millions of drones every fine day throughout the season. It has always been my practice to use the drones from only one colony for mating young queens to. How else can any queen-breeder know by what strain of bees his young queens are mated to? Drone-traps are kept at the entrance of my hives the entire season, excepting on the hive from which the drones are

allowed to fly. I do not like a haphazzard way of mating queens. There is no way by which the queen breeder can have absolute control of the fertilization of his queens as can be done by using the trap. If you come into my apiary between May 20 and Oct. 1, you will find traps on every hive in the yard. The trap in controlling swarming and catching the thousands of useless drones has a world-wide reputation as all practical bee-keepers well know.

I regret very much to have to say that few if any of the supply

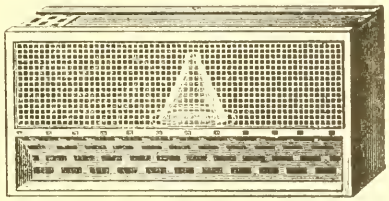


Figure 17

dealers are sending out queen-traps that are of any value. About all who use the traps have an idea that they can improve its construction. Few of these people realize that all those supposed improvements were tested in my yard years before they ever saw the trap. Yet many of these useless and needless improvements have been attached to the trap by those who are selling them, rendering the trap almost worthless.

An improved queen and drone-trap is illustrated in fig. 16. This trap is so constructed that no bees are destroyed by smothering. The trap does not clog and the bees have a clear and easy way through it, in and out of the hive. Three sides are covered by perforated metal, thus affording abundance of ventilation to the hive at all times.

The trap prevents any bees from decamping either before or after a swarm has issued or has been hived. When a swarm issues, all that need be done is to move the hive the bees issue from to a new location, and put an empty hive in its place; take the trap and place it at the entrance of the new hive; the swarm soon returns, and while the bees are running in, draw the top slide to release the queen, and she will enter with the bees. Then stand back and see the swarm rush in pell-mell and take possession of the hive. Whew! what fun on a hot day to have all this

work done without any effort on your part; no climbing trees, fretting, worry or loss of bees.

Last season I saw a trap in Boston that was put up by one of the largest supply dealers in the world. I was amazed when informed that any man who ever kept bees would send out such a thing. The dealer who had it called it the "Alley" trap. I said I invented the Alley trap, but I would not own up as the inventor of a thing like the one in question.

I have not dealt in the traps for many years. But I am so disgusted by what I have seen of the worthless things manufactured by other people, I shall take up the manufacture of them again. Fig. 17 represents old style trap.

BROOM FOR BRUSHING BEES

The first year I had bees I found that feathers were not just the thing with which to brush bees, so a corn broom, such as is used for clothing was utilized, but not until more than one-half the broom was cut out. With a sharp knife cut out nearly two-thirds of the straw material just under the binding. Then when the bees are brushed off the combs none will be destroyed if any are half way in the cells.

This kind of a brush is called the "Coggswell broom." I greatly mistake if I did not sell the Coggswell Brothers of Groton,

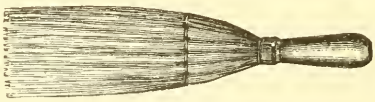


Figure 18

N. Y., the first broom they ever used. The one I use and the so-called Coggswell brush are quite different. There is stock enough in the Coggswell to make a dozen of the kind used by me. See Fig. 18 for illustration of broom.

POINTS IN QUEEN-REARING

TO INSERT A QUEEN-CELL

When a cell is introduced, it is not necessary, nor is it practical, to cut the comb to insert the cell in, as recommended by some bee-keepers. When a queen has been removed and the combs re-

placed in the hive, just thrust your little finger down between the combs near the top-bars, and thus make room for the cell and immediately place it in the opening made. The bees will not destroy the cell if it contains a healthy queen. If it is late in the season and the colony from which the queen is taken is weak in numbers, it will be necessary to place the cell in the middle of the cluster. Even in this case, you will not be obliged to do any cutting as room can be made for the cell by pushing the finger through one of the combs. Place the cell, small end downwards, in the aperture and close the hive.

QUEENS, HOW TO PRESERVE AND CARE FOR THEM

At the swarming season many bee-keepers have more or less queen-cells, and sometimes young queens, they would like to preserve if possible to do so and if proper fixtures were at hand to aid them in carrying out their desires. At just that time several cages, such as are described on a previous page and are used in the queen-nursery, would be the right thing to have. Remove the cells from the hive at the proper time, place them in the nursery-cages and after supplying each cage with food sufficient for a week, or longer, place the nursery in some full colony, according to directions given on another page in connection with the description of the nursery. A much better way for the novice to dispose of queen-cells would be to supersede old queens and at once insert the queen-cells. If this seems too risky, dequeen the hive a few days before the cells are matured, say on the fifth day after a swarm issues. This method of dequeening would do away with the necessity of nucleus colonies which one would be obliged to have in order to preserve young queens until fertilized.

AGE AT WHICH QUEENS MATE

The readers of the different bee-periodicals have not failed to notice the reports, from time to time, of queens being fertilized when two or three days old.

I am inclined to think that all who make reports of queens being fertilized when under five days old must be mistaken. I never knew such a thing to happen in my apiary. Have had thousands of young queens take the mating flight when but *five* days old, but never knew one to do so when under that age.

The fact that I spend all my time during the queen-rearing

season in the yard among my nucleus colonies, and that every means is used to force the young queens to fly and become fertile at the earliest moment possible, should be sufficient to satisfy the reader that I am making no wild statement in this matter.

FORCING QUEENS TO MAKE THE MATING FLIGHT AND TO COMMENCE TO LAY PROMPTLY

The queen dealer is anxious to have his queens mate as soon as possible after they arrive at the proper age. No special pains need be taken while there is a flow of honey to force the queens to take a flight, as they readily do so themselves. After the honey harvest is over, it is quite another affair. At this time a young unfertile queen will not leave the hive, unless encouraged to do so by *feeding*, when under ten or twelve days old. Yet, if the weather is favorable, that is, if the day is clear and warm, and but little wind, ninety-nine out of every hundred queens can be forced to fly on the fifth day after they emerge from the cell. Feeding for this purpose has been an important feature for years in my apiary.

HOW TO KNOW A FERTILE QUEEN FROM AN UNFERTILE ONE

One who has any considerable experience in queen-rearing has no trouble in distinguishing a fertile queen from one that is unfertile. In twelve hours after a queen has mated there is a perceptible increase in her size. Not only is her abdomen larger around, but it is also longer. These conditions are noticeable in the early part of the season, but at the last of September and during the month of October some other way of judging and knowing whether or not a queen has been fertilized must be adopted. While queens that are fertilized early in the season will at once make preparations to deposit eggs, the late fertilized queens do not. That is, the late fertilized queens will not as quickly increase in size after becoming fertile, as they do earlier in the season. Now to decide positively that a queen is fertile I have tested the matter in this way: About half a pint of bees are taken from a colony having an unfertile queen and allowed to run in the hive of the fertile one.

If the queen in the latter hive proves to be fertile, the strange

bees will not molest her; if unfertile, the bees introduced may at once ball and eventually destroy her. This is a simple and quick way to test the matter, and applies only to nucleus colonies, though it may be practiced more or less successfully in full colonies.

Another way to decide whether or not a queen is fertile is to feed honey for a day or so. If fertile she will deposit a few eggs, and lay while the feeding is continued.

AGE WHEN YOUNG QUEENS COMMENCE TO LAY AFTER BECOMING FERTILE

Young queens, as a rule, commence to lay from thirty-six to forty-eight hours after they become fertile.

The time varies according to the season. During the honey harvest nearly every young queen will commence to lay in about thirty-six hours after mating. Later in the season, when no honey is being gathered, it will be from forty-eight hours to three days.

I never have found a young queen laying when less than *seven* days old.

FERTILIZING IN CONFINEMENT

I believe there is not a well authenticated case recorded where a queen was ever fertilized in confinement. Why should any one desire to have queens fertilized in any other way than the one provided by nature? By the use of the improved appliances for controlling and destroying useless and worthless drones, it is an easy matter to have any and all queens mated to any strain of drones desired.

A practical method of having queens fertilized in confinement will not be devised for a long time to come. However, no one can tell what a day may bring forth. There are a good many wise heads at work upon the knotty questions connected with bee-culture.

RESPECT BEES SHOW THEIR QUEEN

When a fertile queen moves about the combs her subjects always open a way for her to pass, and the bees seem to vie with each other in the respect they show their ruler.

The virgin queen never has much respect shown her. The

workers do not even trouble themselves to get out of her way when she moves about the cluster. She must run over the bees and get about the best she can.

When a hive is opened and combs removed, a virgin queen is pretty sure to take wing, especially if the operation of removing the frames is not performed quietly, or late in the day. However, there is no danger of the queen being lost as she will fly but a short distance from the hive and immediately return.

DESTROYING QUEEN-CELLS WHEN INTRODUCING QUEENS

As stated on a previous page, some queen-cells will be built on the combs that have brood in them. It will not be necessary to look the combs over and destroy those cells if a *young* queen is introduced. In the course of twenty-four hours after the queen gets possession of the combs, she will destroy the cells, that is, the queen will open them near the base and sting the nymph, or nearly matured queen as the case may be, and the bees will soon finish the work of destroying the cell, and removing the dead queen. There are, however, exceptions to this rule, and once in a while a young queen is permitted to "hatch out" and take possession of the colony. In that case, the queen just introduced is destroyed. This so seldom happens, and does not happen at all except in cases where an *old* queen is introduced, that it is not worth while to spend time in looking the combs over for queen-cells.

THE OBSERVATORY HIVE FOR STUDYING THE HABITS OF BEES

I know of no better way for the novice to study the habits of the honey-bee than can be done by an observation hive, such as is illustrated in fig. 19. This hive has but one comb which is inserted between two plates of glass. Anyone can make such a hive at small expense. Get out a frame, groove for the glass to slide in, leaving an inch and a quarter between the glass for the comb and frame. Wooden covers are used to keep out the light. Arrange it so that the bees pass to and from the hive under the bottom sash of a window, and in such a way that no bees can enter the room.

When thus arranged there is no danger of anyone being stung while observing the bees work. Here every movement of

the colony and queen can be seen, and all work from the laying of the egg to the sealed brood may be seen at any time; how the bees remove pollen from their legs; how they behave when de-

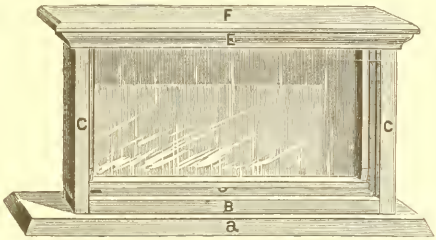


Figure 19

prived of their queen, and how they start and build a queen-cell, store honey in the combs, etc.

If the observation hive contains a small colony of bees and an unfertile queen, it will be seen that the bees do not take the least notice of her. Apparently she is of no more consequence before becoming fertile than other bees in the hive; yet should she be removed from the colony, the bees would soon miss her, and make as much fuss over her loss as they would had she been a fertile queen. The fact that bees pay no attention to a queen, is the best evidence that she is not fertile.

Figure 20

Figure 21

COMPARATIVE SIZE OF QUEENS

Figure 20 nicely and accurately represents a large, fine and well-developed fertile queen bee. I have reared many queens equally as large as the one illustrated in above cut.

Figure 21 is a good and life-size view of an unfertile queen. Such queens vary much in size.

No one should judge of the size of a queen until she is given a chance to develop in a full colony of bees.

Queens kept in small nucleus colonies never reach full development. They must be given larger quarters in order to show to what size they will attain.

PREVENTING HONEY FROM CANDYING

Some years ago I accidentally discovered a process by which honey that has once candied can be preserved in the liquid state for a long time.

It is my opinion that it is much the best plan to let all honey candy and then liquify it. Possibly there are some kinds of honey that if treated by the process below given, would not remain in the liquid state only a short time. But for most kinds the treatment will be a success, and preserve it many months.

Several years ago I received some honey in sixty-pound cans that was nearly as hard as sugar. It was melted and put in half-pound bottles. To keep it from candying again before I could dispose of it, the bottles were placed on a shelf over the kitchen stove, where the temperature would rise to 110 degrees during the day and would not go below 60 degrees at night. This same lot of honey stood zero weather for two winters without going back.

The above is the entire process. It is heat for a long time that does the business. Honey in large cans would need to be kept in a high temperature at least a month, but the process will surely prevent it from candying after it is once liquified.

Arrange the details of heating to suit your conditions. Large quantities of honey can be kept in a room well up from the floor, and a good hot fire running for a long time.

Steam heat, if convenient to use, is the proper thing. Small quantities of honey can be treated about as mentioned in my own case.

TO THE READER

If the methods herein given for rearing queens is not made clear I shall be glad at any time to give personal explanation. Later on I may issue a "supplement" in which many of the parts of my system of queen-rearing will be illustrated and more minutely explained. Send in the questions and they shall receive attention.

THE QUEEN-REARING OUTFIT

There are certain necessary things used in queen-rearing which I can supply at the prices given opposite each article named.

The queen nursery, 35 cages, $1.50.

The tin pipe for burning tobacco when introducing queens, 50 cents.

Small hive, four frames, nailed ready for use, including cone-feeder, 50 cents.

Small hive complete, including pint of bees, one best Adel breeding queen, $5.00.

Same with select tested Adel queen, $4.00.

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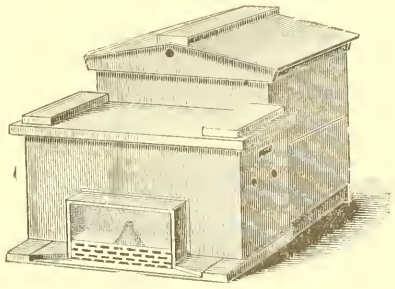

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